

1. Multiply.

$$4\sqrt{3} \cdot 2\sqrt{6}$$

A $6\sqrt{9}$

B $8\sqrt{9}$

✓ C $24\sqrt{2}$

D $72\sqrt{2}$

$$\begin{aligned} 4\sqrt{3} \cdot 2\sqrt{6} &= 8\sqrt{3 \cdot 6} = 8\sqrt{18} = 8\sqrt{9 \cdot 2} = \\ &= 8\sqrt{9} \cdot \sqrt{2} = 8 \cdot 3\sqrt{2} = 24\sqrt{2} \end{aligned}$$

2. The endpoints of \overline{AB} are $A(1, 2)$ and $B(5, 6)$. Which of these points is the midpoint of \overline{AB} ?

✓ A $(3, 4)$

B $(2, 2)$

C $\left(\frac{3}{2}, \frac{5}{2}\right)$

D $\left(\frac{7}{2}, \frac{7}{2}\right)$

$$x_1 = 1 \quad y_1 = 2 \quad x_2 = 5 \quad y_2 = 6$$

$$x_m = \frac{x_1 + x_2}{2} = \frac{1 + 5}{2} = \frac{6}{2} = 3$$

$$y_m = \frac{y_1 + y_2}{2} = \frac{2 + 6}{2} = \frac{8}{2} = 4$$

$$(3, 4)$$

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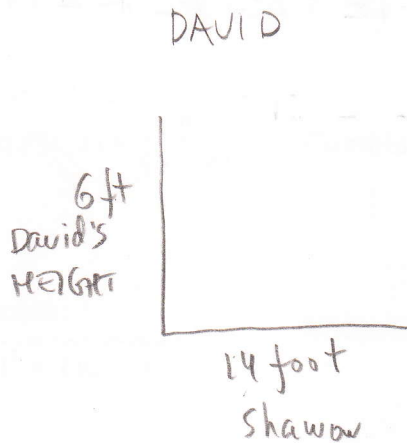
3. David visited the Liberty Bell display in Philadelphia and wanted to find the actual height of the bell. He is 6 feet tall and casts a 14-foot shadow when standing next to the bell. At the same time, the bell casts a 7-foot shadow alongside David's shadow. Which proportion can be used to find b , the height of the Liberty Bell in feet?

A $\frac{7}{b} = \frac{6}{14}$

✓ B $\frac{b}{7} = \frac{6}{14}$

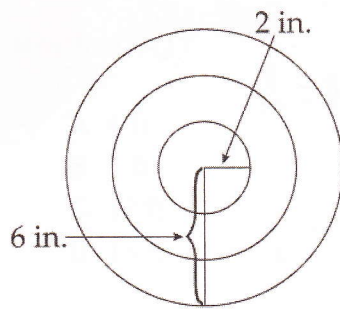
C $\frac{b}{14} = \frac{6}{7}$

D $\frac{14}{b} = \frac{6}{7}$



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4. What is the probability that a randomly thrown dart will land in the center circle of the dart board?



$$R = 6 \text{ in}$$

$$A_o = \pi R^2 = \pi \cdot 6^2 = 36\pi$$

$$r = 2 \text{ in} \quad A_c = \pi r^2 = \pi \cdot 2^2 = 4\pi$$

✓ A $\frac{1}{9}$

B $\frac{1}{3}$

C $\frac{4}{9}$

D $\frac{2}{3}$

$$P = \frac{A_c}{A_o} = \frac{4\pi}{36\pi} = \frac{1}{9}$$

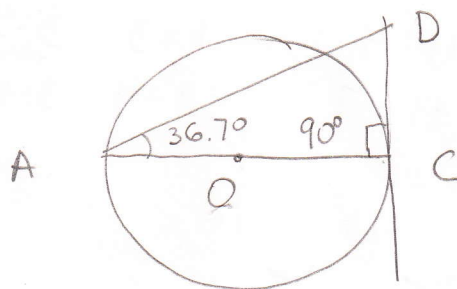
5. \overline{AC} is the diameter of circle O and \overline{CD} is a tangent. The measure of $\angle CAD$ is 36.7° . What is the measure of $\angle ADC$?

A 143.3°

✓ B 90.0°

C 53.3°

D 36.7°



$$m\angle ADC = 90^\circ - 36.7^\circ = 53.3^\circ$$

6. Segment \overline{JK} has endpoints $J(1, 4)$ and $K(5, 2)$. What is the length of \overline{JK} to the nearest tenth?

A 3.5 units

B 2.0 units

C 8.5 units

✓ D 4.5 units

$$x_1 = 1 \quad y_1 = 4 \quad x_2 = 5 \quad y_2 = 2$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(5 - 1)^2 + (2 - 4)^2} \approx 4.47 \approx \underline{\underline{4.5}}$$

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7. Which shape must have diagonals that are perpendicular?

- ✓ A rectangle
B rhombus
C trapezoid
D pentagon

8. The bases of a right triangular prism are right triangles, each with legs of 8 inches and 15 inches. The lateral length of the prism is 18 inches. What is the total surface area of the triangular prism?

- A 960 square inches
B 720 square inches
✓ C 1080 square inches
D 840 square inches



$$A_{\text{base}} = \frac{b \cdot h}{2} = \frac{8 \cdot 15}{2} = 60 \text{ in}^2$$

$$2 \text{ Bases} = 60 \cdot 2 = 120 \text{ in}^2$$

$$X = \sqrt{8^2 + 15^2} = \sqrt{289} = 17 \text{ in}$$

$$A_{\text{L.S.}} = 8 \cdot 18 + 15 \cdot 18 + 17 \cdot 18 = 18(8 + 15 + 17) = 720 \text{ in}^2$$

$$A = A_{\text{base}} + A_{\text{L.S.}} = 120 + 720 = 840 \text{ in}^2$$

9. A saleswoman uses this sequence of numbers to identify which listings in a phone book to call to advertise for new business.

4, 7, 10, 13, 16, ...

If 4 is the first term in the pattern, which of these represents the n th term in the pattern?

- A $n + 3$
B $n^2 + 3$
C $2n + 6$
✓ D $3n + 1$

$$3n + 1$$

$$n = 1 \quad 3 \cdot 1 + 1 = 4$$

$$n = 2 \quad 3 \cdot 2 + 1 = 7$$

$$n = 3 \quad 3 \cdot 3 + 1 = 10$$

$$n = 4 \quad 3 \cdot 4 + 1 = 13$$

$$n = 5 \quad 3 \cdot 5 + 1 = 16$$

4 7 10 13 16

3 3 3 3

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10.

A circle has a radius of 6 feet. \widehat{FG} is $\frac{1}{9}$ of the circumference of the circle. To the nearest foot, what is the length of \widehat{FG} ?



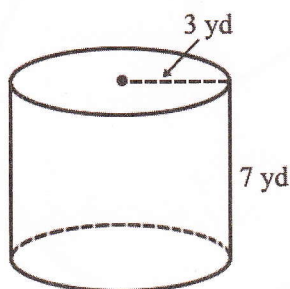
- A 4 ft
- B 5 ft
- C 12 ft
- D 13 ft

$$R = 6 \text{ ft}$$

$$C = 2\pi R = 2\pi \cdot 6 = 12\pi = 12 \cdot 3.14 = 37.68$$

$$C_{\frac{1}{9}} = 37.68 \cdot \frac{1}{9} = 4.2 = 4 \text{ ft}$$

11. Look at the figure.



$$V = \pi R^2 \cdot h = \pi \cdot 3^2 \cdot 7 = 3.14 \cdot 9 \cdot 7 = 197.82 \text{ yd}^3$$

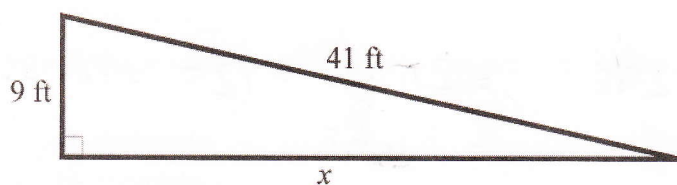
Use $\pi = 3.14$

What is the volume of the figure?

- A 65.94 cubic yards
- B 188.4 cubic yards
- ✓ C 150.72 cubic yards
- D 197.82 cubic yards

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12. What is the value of x in the right triangle below?



- ✓ A 32 ft
B 40 ft
C 42 ft
D 80 ft

$$x = \sqrt{41^2 - 9^2} = 40 \text{ ft}$$

13. Simplify.

$$\frac{2^6}{2^3} = 2^{6-3} = 2^3 = 8$$

- ✓ A 4
B 8
C 64
D 512

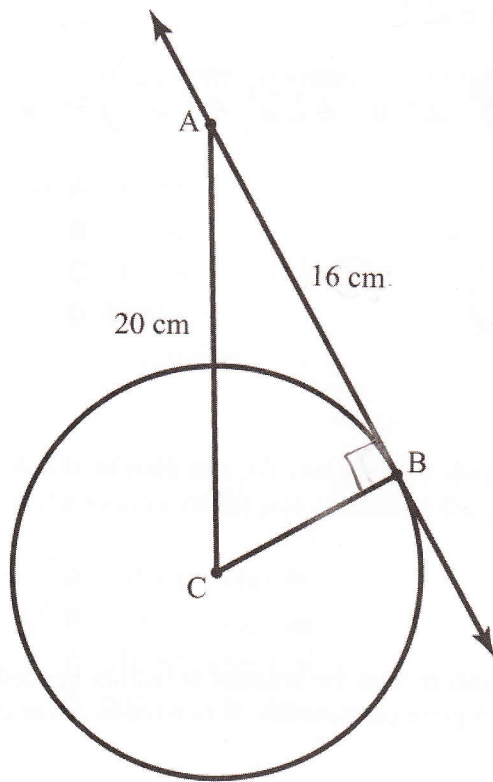
14. With which of the following lists of measures is it possible to construct a triangle?

- A 2 cm, 3 cm, 5 cm
✓ B 6 cm, 6 cm, 13 cm
C 8 cm, 11 cm, 18 cm
D 12 cm, 17 cm, 30 cm

$$\underline{8 + 11 > 18}$$

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15. Look at this circle with center C .



$$R = CB$$

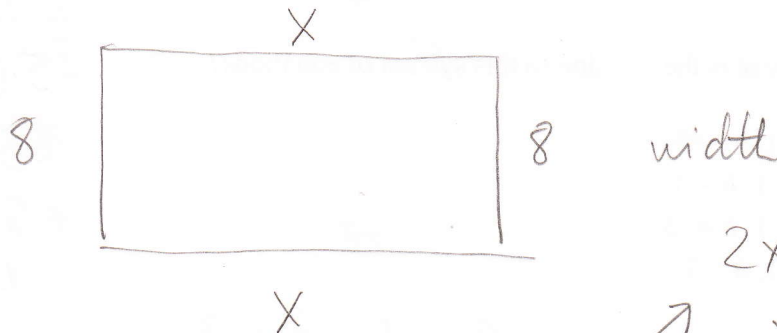
$$CB = \sqrt{20^2 - 16^2} = \sqrt{400 - 256} = 12$$

If \overline{AB} is tangent to the circle at point B , what is the measure of the radius of the circle?

- A 4 cm
- B 10 cm
- ✓ C 12 cm
- D 24 cm

16. The perimeter of a rectangle is 40 cm. If the width of the rectangle is 8 cm, which of these is the length of the rectangle?

- ✓ A 5 cm
- B 12 cm
- C 16 cm
- D 24 cm



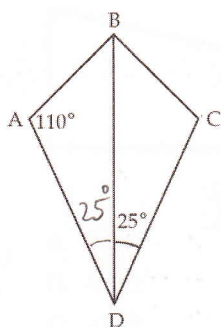
$$8 + x + 8 + x = 40; \quad 2x + 16 = 40$$

$$2x = 24$$

$$\nearrow \quad \underline{x = 12 \text{ cm}}$$

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17. In the figure below, ABCD is a kite. What is the measure of $\angle ABC$?



$$\begin{aligned} \angle C &= 110^\circ & \angle A &= \angle C \\ m\angle ABC &= 360^\circ - (110^\circ + 110^\circ + 25^\circ + 25^\circ) = \\ &= 90^\circ \end{aligned}$$

- ☐ A 45°
☐ B 50°
☒ C 90°
☐ D 110°

18. The manufacturer of a 23.9-centimeter diameter basketball wants to find the amount of leather needed to cover its new line of basketballs. About how much leather, in square centimeters, is needed to cover each new basketball? Use 3.14 for π .

- ☒ A 300.2
☐ B 1,793.6
☐ C 7,144.5
☐ D 21,433.5

$$\begin{aligned} D &= 23.9 \text{ cm} \\ A &= 4\pi R^2 = 4 \cdot 3.14 \cdot \left(\frac{23.9}{2}\right)^2 = 1,793.6776 \text{ cm}^2 \end{aligned}$$

19. Look at this system of equations.

$$3a - 2b = -9 \quad (\times 2)$$

$$5a + 4b = 7$$

$$6a - 4b = -18$$

$$5a + 4b = 7$$

$$11a = -11$$

$$a = -1$$

Which of these is the solution to this system of equations?

- ☒ A $a = 1, b = -3$
☐ B $a = -1, b = 3$
☐ C $a = -1, b = -3$
☐ D $a = 1, b = 3$

$$a = -1 \quad b = 3$$

$$\begin{aligned} 5 \cdot (-1) + 4b &= 7 \\ -5 + 4b &= 7 \\ +5 & \quad +5 \\ 4b &= 12; \quad b = 3 \end{aligned}$$

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20. A circle has a circumference of 120 mm. What is the length of \widehat{JK} on the circle, if the measure of \widehat{JK} is 30° ?

- ✓ A 10 mm
B 30 mm
C 40 mm
D 60 mm

$$C = 120 \text{ mm}$$

$$\frac{120}{x} = \frac{360^\circ}{30^\circ}$$

$$360x = 120 \cdot 30$$

$$x = \frac{120 \cdot 30}{360} = \frac{30}{3} = 10 \text{ mm}$$

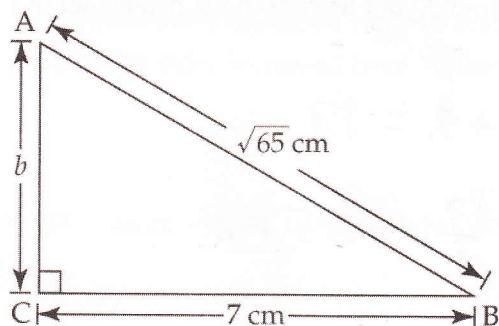
21. A pile of rock at a job site is in the shape of a right circular cone that is 9 feet tall and 12 feet wide. What is the volume of the pile of rock at the job site? Use 3.14 for π .

- ✓ A 1356.48 cubic feet
B 339.12 cubic feet
C 316.83 cubic feet
D 203.79 cubic feet

$$h = 9 \text{ ft} \quad D = 12 \text{ ft} \quad R = \frac{12}{2} = 6 \text{ ft}$$

$$V = \frac{1}{3} \pi R^2 \cdot h = \frac{1}{3} \cdot 3.14 \cdot 6^2 \cdot 9 = 339.12 \text{ ft}^3$$

22. What is the value of b in the right triangle below?



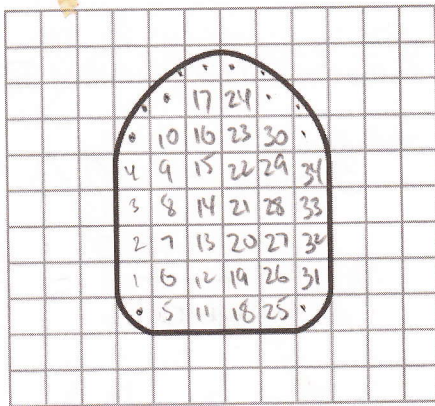
- ✓ A 4 cm
B 12 cm
C 16 cm
D 58 cm

$$b = \sqrt{(\sqrt{65})^2 - 7^2} =$$

$$= \sqrt{65 - 49} = \sqrt{16} = 4 \text{ cm}$$

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23. Look at this figure.



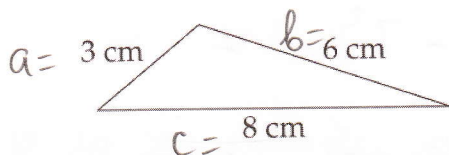
34 full squares
• 12 partial squares

$$34 + \frac{12}{2} = 34 + 6 = 40$$

What is the approximate area of the figure?

- A 23 square units
- B 48 square units
- C 46 square units
- ✓ D 41 square units

24. Heron's formula states that if s is half the perimeter of a triangle with sides of lengths a , b , and c , then the area of the triangle is given by: $A = \sqrt{s(s-a)(s-b)(s-c)}$
Use Heron's formula to find the area of the triangle below. (Round your answer to the nearest tenth.)



perim. $P = 3 + 6 + 8 = 17$

half per. $s = \frac{P}{2} = \frac{17}{2} = 8.5 \text{ cm}$

- ✓ A 7.6 cm^2
- B 9.0 cm^2
- C 58.4 cm^2
- D 153.5 cm^2

$$A = \sqrt{8.5(8.5-3)(8.5-6)(8.5-8)} =$$

$$\approx 7.64 \approx 7.6 \text{ cm}^2$$

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25. The diameter of a circle measures 6 meters. Which of these is the area of the circle to the nearest tenth?

- ✓ A 18.8 square meters
B 28.3 square meters
C 37.7 square meters
D 113.1 square meters

$$d = 6 \text{ m} \quad R = \frac{d}{2} = 3 \text{ m}$$

$$A_0 = \pi R^2 = 3.14 \cdot 3^2 = 28.26 \approx 28.3 \text{ m}^2$$

26. The approximate surface area of Earth is 196,960,000 square miles. Using this measurement, which of these is the approximate radius of Earth to the nearest mile? Use $\pi = 3.14$.

- ✓ A 360
B 3,960
C 7,920
D 7,840,800

$$A = 4\pi R^2$$

$$R^2 = \frac{A}{4\pi}$$

$$R = \sqrt{\frac{A}{4\pi}} =$$

$$= \sqrt{\frac{196,960,000}{3.14 \cdot 4}} = 3960$$

27. A square-shaped patio has sides of 10 feet. The patio is expanded so that it is no longer a square. The new rectangular patio has a perimeter of 48 feet. Which of these could be the change in dimensions of the patio?

- ✓ A Two sides increased from 10 feet to 14 feet.
B Two sides increased from 10 feet to 24 feet.
C Four sides increased from 10 feet to 12 feet.
D Four sides increased from 10 feet to 14 feet.

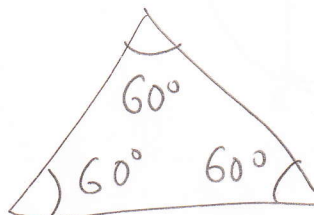
$$10 + 10 + 14 + 14 = 48 \text{ ft}$$

$$P = 10 \cdot 4 = 40 \text{ cm}$$

$$10 + 10 + 14 + 14 = 48 \text{ cm}$$

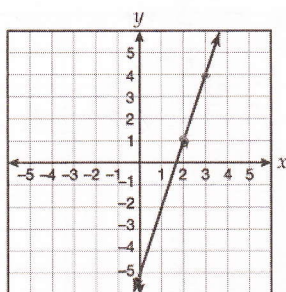
28. $\triangle PQR$ is an equilateral triangle. What is the measure of $\angle R$?

- A 45°
B 30°
✓ C 90°
D 60°



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29. What is the equation of the line shown below?



A $y = \frac{1}{3}x - 5$

B $y = -3x - 5$

✓ C $y = 3x - 5$

D $y = 5x - 3$

$$y = mx + b$$

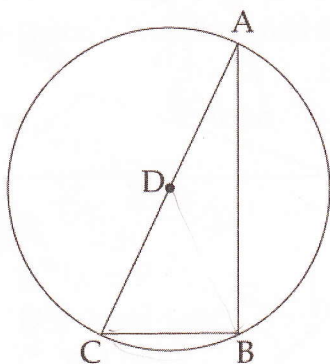
$$b = -5$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 1}{3 - 2} = \frac{3}{1} = 3$$

$$y = 3x - 5$$

$$\begin{array}{ll} x_1 = 2 & x_2 = 3 \\ y_1 = 1 & y_2 = 4 \end{array}$$

30. Triangle ABC is inscribed in circle D. If the measure of \widehat{BC} is 60° , what is the measure of angle A?



$$m\angle A = \frac{60^\circ}{2} = 30^\circ$$

A 15°

✓ B 30°

C 60°

✓ D 120°